

WHAT IS CLAIMED:

- 1 1. A process for producing styrene by catalytic
2 dehydration using at least two separate reactors,
3 said process comprising:
4 (a) feeding a 1-phenylethanol-rich reaction
5 mixture to a first reactor operating at a
6 temperature between 150 °C and 350 °C; and
7 (b) transferring the partially catalytically
8 dehydrated mixture to a second reactor
9 operating at a temperature between 150 °C
10 and 350 °C.
- 1 2. The process of claim 1, in which step (a) is
2 followed by the following steps:
3 (b) transferring the partially catalytically
4 dehydrated mixture to a distillation unit;
5 (c) separating the mixture from the distillation
6 unit into a fraction comprising low-
7 molecular weight compounds and high
8 molecular weight compounds;
9 (d) transporting the fraction comprising low-
10 molecular weight compounds to an outlet; and
11 (e) transporting the fraction comprising high
12 molecular weight compounds to a second
13 reactor.
- 1 3. The process of claim 2, in which step (b)
2 comprises:
3 (b) transferring part of the catalytically
4 dehydrated mixture to a distillation unit, and
5 part of the mixture to a second reactor operating
6 at a temperature between 150 °C and 350 °C.
- 1 4. The process of claim 3 wherein step (b) further
2 comprises recycling part of the mixture from the
3 second reactor into the first reactor.

1 5. The process of claim 3 wherein step (b) further
2 comprises transferring part of the mixture from the
3 second reactor to a third reactor.

1 6. The process of claim 3 wherein step (b) further
2 comprises transferring part of the mixture from the
3 second reactor to the distillation unit.

1 7. The process of claim 3 wherein step (b) further
2 comprises transferring part of the mixture from the
3 second reactor to a second distillation unit.

1 8. The process of claim 1 wherein the dehydration
2 reaction is performed in the liquid phase at a
3 reactor temperature of 180 °C to 280 °C.

1 9. The process of claim 8 wherein a reactor
2 temperature of 200 °C to 260 °C is used.

1 10. An apparatus for producing styrene by catalytic
2 dehydration of 1-phenylethanol comprising a feed line
3 to a first reactor with optionally a recycle inlet
4 and further comprising at least one of a conduit to a
5 second reactor and a conduit to a distillation unit,
6 comprising at its upper end an outlet for releasing
7 low-molecular compounds and at its lower end a
8 conduit for feeding high-molecular compounds into the
9 second reactor, comprising at least one inlet for
10 high-molecular compounds, optionally a conduit to the
11 distillation unit or to another distillation unit,
12 and optionally an outlet to a conduit that is
13 connected to the optional recycle inlet of the first
14 reactor and/or a conduit to a further reactor, at
15 least one of the first and second reactor comprising
16 a conduit to the distillation unit.

1 11. The apparatus of claim 10 comprising a first
2 reactor with an optional recycle inlet and a conduit
3 to a second reactor, comprising a conduit to the
4 distillation unit and optionally an outlet to the

5 conduit that is connected to the optional recycle
6 inlet of the first reactor.